INFORMATION

Summary of Information Regarding Some of the Newer Insecticides

The past few years have witnessed intense research in the development of new insecticides with resulting products such as DDT, DDD, chlordane and others which have proven to be a boon to the agricultural industry. However, these new compounds, besides being effective insect killers, are also toxic to humans and can be dangerous if improperly handled. Most recently a new group of compounds, the organic phosphates, has come into use and represents a potential threat to human beings.

Hexaethyl tetraphosphate (HETP) was developed in Germany and in that country was known as "Bladan." Tetraethyl pyrophosphate (TEPP), which is the active toxic ingredient in HETP, was independently developed at the University of Chicago a short time ago. Both these compounds are heavy, syrupy liquids freely miscible with water. On contact with moisture they readily hydrolyze and lose their toxicity; hence there is little residual action as in the case of DDT.

They are both extremely toxic to insects and animals, and very minute amounts (2-10 mgm/kgm) are fatal to experimental animals. Several cases of poisoning in humans have occurred in California and because of the increasing use of the compounds others will doubtless be reported.

Absorption—These products are freely absorbed from the gastro-intestinal tract following ingestion. In addition, experimentally, they are rapidly absorbed through the intact skin, a property which makes them extremely hazardous. They are only slightly irritating when first applied to the skin so that there is no immediate warning sign as to the potential danger. Instillation in the eye produces immediate local reaction. It is probable that they are also absorbed through inhalation of their vapors.

Pharmacology—HETP and TEPP act pharmacologically by causing an irreversible destruction of the enzyme cholinesterase. As a result of this action there is an accumulation in the body of acetyl choline with consequent symptoms of excessive parasympathetic nervous stimulation, producing both muscarine and nicotinic effects.

Symptoms—Symptoms of acute poisoning with these compounds are primarily those due to parasympathetic stimulation. There is marked pupillary contraction and spasms of the eye muscles of accommodation which may persist for two or three days, resulting in blurred vision and inability to focus on distant objects. There is frequently a feeling of tightness of the chest and observers have noted dyspnea, bronchial spasm and pulmonary edema resulting from capillary dilatation and excessive glandular secretions in the bronchi and bronchioles. The smooth muscle of the gastro-intestinal tract becomes spastic, causing vomiting, constipation or diarrhea, and abdominal cramps. The central nervous system is affected, causing excitement and sometimes convulsions, frequently followed by central nervous system depression.

Death in acute poisoning may be due to any one of the following mechanisms:

1. Bronchial constriction and cardiovascular collapse.
2. Central nervous system stimulation and eventual depression.
3. Stimulation and eventual depression of neuromuscular junctions.
4. Accidents occurring as a result of the visual or mental impairment.

Information regarding chronic toxicity and cumulative action is both incomplete and inconsistent. Experimental animals receiving sub-lethal doses have survived with no residual damage, presumably because they were able to reproduce enough cholinesterase to replace the amount destroyed by the insecticide. However, further studies on this point are necessary.

Diagnosis—At the present time diagnosis of intoxication with one of these compounds depends mainly on an awareness of the syndrome and on a high index of suspicion in areas where these chemicals are being used. Any person who may possibly have come in contact with these insecticides, complaining of "blindness," blurred vision, tightness of the chest or any of the other symptoms mentioned should be suspected of suffering from acute intoxication with an organic phosphate. The laboratory finding of reduced cholinesterase in the plasma is confirmatory evidence.

Treatment—Atropine protects against, and counteracts, the central and autonomic nervous system disturbances caused by these phosphates. Therapeutic doses (0.1 - 0.5 mgm/kgm) protect experimental animals against 3 to 4 lethal doses. Curariform agents, especially the magnesium ion, protect the myoneural junction against the nicotinic effects. The most effective therapy is a combination of atropine and magnesium.

Prevention—Poisoning by these compounds can be prevented if proper attention is given to safe methods of handling them and if all persons concerned appreciate fully their extreme toxicity. All contact with the bare skin must be avoided and im-

From the California Department of Public Health.

pervious gloves must be worn when handling the compounds. If any of the material gets on the skin it should be thoroughly washed off with copious amounts of soap and water. Inhalation of TEPP and HETP dust, mists and aerosols should be avoided by use of a mask approved by the State Division of Industrial Safety. Workers should change clothes completely and bathe with soap and water after using the material. Contamination of food and tobacco of course should be avoided. Any exposed person developing symptoms should immediately be removed from the exposure and should be seen by a physician as soon as possible.

Bureau of Adult Health—Physicians are urged to report cases of poisoning from insecticides to the Bureau of Adult Health, 2002 Acton Street, Berkeley 2, California. The Bureau is compiling such reports to be used as a basis for study of the problem. The Bureau's personnel and facilities are available to physicians for assistance in the diagnoses of these cases.

Another organic phosphate which is coming into widespread use is Parathione. Since this compound differs somewhat chemically and pharmacologically from HETP and TEPP, it will be discussed in a future bulletin.

REFERENCES

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3. Dayrit, C., Manry, C. and Seevers, M.: Pharmacology of hexaethyl tetraphosphate, Journal of Pharmacology and Experimental Therapeutics (Feb.), 1948.

Lion Roars Less Loudly

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The Comitia of the Royal College of Physicians, acting in a spirit of sweet reasonableness, has forwarded two resolutions to the minister of health, Aneurin Bevan, vociferous sponsor of the National Health Service Act of 1946. The first suggests that an act be brought in by the minister of health amending the National Health Service Act of 1946 by discarding full-time medical service by regulation. The second recommends a bill to make regulations affecting the National Health Service subject to special parliamentary procedure rather than to ministerial dictation alone.

Mr. Bevan, departing from his accustomed role, has apparently listened to the voice of the British Medical Association as expressed in its plebiscite of January 31, in which it overwhelmingly rejected the National Health Service Act as it was originally written.

He has now proposed his own modifications of the Act. In these he relinquishes a full-time service to be brought into effect by regulation and also modifies the proposal for a universal basic salary, limiting such salaries to three years, after which the practitioner may make his own decision whether to continue with salary and capitation fee, or to continue with a capitation fee as the sole source of income from practice. These new proposals represent a considerable willingness to compromise, since even his own party is not entirely in sympathy with them.

The Government, according to Mr. Bevan's parliamentary secretary, now recognizes that a full-time salaried service is incompatible with free choice of physician by the patient; more, it recognizes the importance of the principle of free choice of physician and therefore puts forward the compromise of payment partly by capitation fee and partly by salary. Further, although the buying and selling of public practices will still be forbidden, every doctor will be free to practice where he wishes, except in professionally overcrowded areas, and will have the right to choose his partner or assistant.

A few strands of democracy will remain in Britain's anchor line, although, as the *British Medical Journal** phrases it, "Mr. Bevan's machinery may provide that justice will be done, but we doubt whether it will make it possible that justice 'may manifestly be seen to be done.' "

A plebiscite on the amendments proposed by the Government indicates that approximately 64 per cent of the British Medical Association members still disapprove of the Act, with 36 per cent approving. Only 52 per cent, however, are against serving under the Act whether they like it or not, a majority so bare that further organized resistance seems impossible.

There is no question that, with Britain's peculiar genius for compromise, the doctors of England will now unite in an organized effort to make the new system effective.

*Editorial. Plebiscite, Brit. M. J., 1:791-793, 1948.